

# PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:  
BENJAMIN L. VOLK, JR.  
THOMPSON COBURN LLP  
ONE US BANK PLAZA  
ST. LOUIS, MO 63101

## PCT

### NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference 53047-45147	Date of Mailing (day/month/year)
International application No. PCT/US03/40148	International filing date (day/month/year) 03 December 2003 (03.12.2003)
Applicant WASHINGTON UNIVERSITY	

1. ☒ The applicant is hereby notified that the international search report has been established and is transmitted herewith.

**Filing of amendments and statement under Article 19:**  
The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

**When?** The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

**Where?** Directly to the International Bureau of WIPO, 34, chemin des Colombettes  
1211 Geneva 20, Switzerland, Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

Shortly after **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90 *bis*.1 and 90 *bis*.3, respectively, before the completion of the technical preparations for international publication.

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No.	Authorized officer Amélia Au  Telephone No. (703)305-3900
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Form PCT/ISA/220 (April 2002)

(See notes on accompanying sheet)

## RECEIVED

JUN 21 2004

Thompson Coburn LLP

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From the INTERNATIONAL SEARCHING AUTHORITY

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(PCT Rule 44.1)

Applicant's or agent's file reference 53047-45147	Date of Mailing (day/month/year) <b>18 JUN 2004</b>
International application No. PCT/US03/40148	International filing date (day/month/year) 03 December 2003 (03.12.2003)
Applicant WASHINGTON UNIVERSITY	

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Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No.	Authorized officer  Amelia Au Telephone No. (703)305-3900
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# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 53047-45147	<b>FOR FURTHER ACTION</b>	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. PCT/US03/40148	International filing date ( <i>day/month/year</i> ) 03 December 2003 (03.12.2003)	(Earliest) Priority Date ( <i>day/month/year</i> ) 03 December 2002 (03.12.2002)
Applicant WASHINGTON UNIVERSITY		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 5 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the Report**

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing:



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (See Box II).

4. With regard to the **title**,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 2



as suggested by the applicant.



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.



None of the figures

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/40148

## Box III TEXT OF THE ABSTRACT (Continuation of Item 5 of the first sheet)

The technical features mentioned in the abstract do not include a reference sign between parentheses (PCT Rule 8.1(d)).

### NEW ABSTRACT

A method for the automated detection of target structures shown in digital medical images, the method of comprising: (1) generating a three dimensional (3D) volumetric data set (108) of a patient region within which the target structure resides from a plurality of segmented medical image slices; (2) grouping contiguous structures that are depicted in the 3D volumetric data set to create corresponding grouped structure data sets (112, 114); (3) assigning each grouped structure data set to one of a plurality of detection algorithms(116), each detection algorithm being configured to detect a different type of target structure; and (4) processing each grouped structure data set according to its assigned detection algorithm to thereby detect whether any target structures are present in the medical images (120, 122). Preferably, the target structures are pulmonary nodules, and a specialized detection algorithm is applied to image data classified as a candidate for depicting perivascular nodules. To segment perivascular nodule candidates from surrounding vessels, the image data is preferably correlated with a plurality of 3D morphological filters.

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/40148

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G06K 9/00

US CL : 382/131

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : Please See Continuation Sheet

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,987,094 A (CLARKE et al) 16 November 1999 (10.30.1997), column 3, lines 50-68 and column 6, lines 35-55	1-68
Y	US 6,609,021 B1 (FAN et al) 19 August 2003 (20.05.2002), column 2, lines 1-50	1-68
A	US 6,240,201 B1 (XU et al) 29 May 2001 (24.07.1998), column 2, lines 40-68.	1-68
A	US 6,678,399 B2 (DOI et al) 13 January 2004 (23.11.2001) column 3, lines 45-65	1-68
A	US 6,466,687 B1 (UPPALURI et al) 15 October 2002 (02.11.1998), column 2, lines 45-68	1-68

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

23 April 2004 (23.04.2004)

Date of mailing of the international search report

18 JUN 2004

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US  
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Authorized officer

Amelia Au

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# INTERNATIONAL SEARCH REPORT

PCT/US03/40148

## Continuation of B. FIELDS SEARCHED Item 1:

382/130, 131, 132, 171, 172, 190, 260, 261, 266

378/21, 23, 62, 4